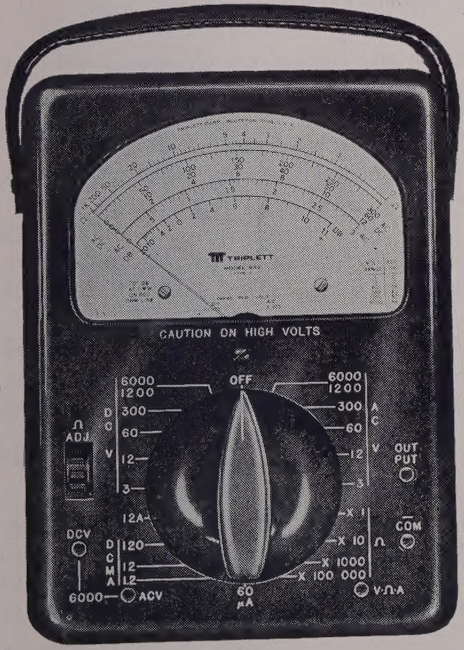
TRIPLETT

INSTRUCTION MANUAL

MODEL 630 TYPE 3
VOLT-OHM-MILLIAMMETER

MP MASTER
MA26291

INSTRUCTION MANUAL



Model 630

Volt-Ohm-Milliammeter

Triplett Corporation

Bluffton, Ohio 45817

SAFETY NOTICE

Electricity can be dangerous. Observe good safety practice when making measurements on electrical circuits.

Never touch any exposed energized electrical circuit since contact may cause burns or produce lethal electrical currents.

Before making any measurement with the V.O.M. make sure that the switches and test leads are all in their proper locations for the function and range desired.

Never make a range or a function change in the V.O.M. while connected in or to a live circuit.

When measuring high voltages special additional precautions are necessary. Turn off the power before connecting the test probes. Make sure that any capacitors in the circuit are discharged. If no voltage is present, clip the test probes to the circuit. Arrange the V.O.M. and test leads to be clear of grounds, etc.

Turn on the power, and make your reading. Do not handle or touch the V.O.M., test leads or probes while the power source is on. Turn off the power — observe the meter to see that it has returned to "Zero," before removing the probes from the circuit.

CAUTION — In High Power circuit areas such as distribution transformers, dangerous arcs of explosive nature can occur if the circuit is shorted. A V.O.M. switched to a current or low ohm range, when it should be on a voltage range could be the cause of an explosive short. **Always be sure that the V.O.M. is set up for the correct function and range before attempting any measurement.**

TABLE OF CONTENTS

Specifications 4

Introduction 6

General Instructions 6

Measuring DC Volts 8

Measuring AC Volts 10

Measuring DC Current 12

Measuring DC Resistance 14

Measuring Output Volts 16

Measuring Decibels 16

Maintenance 18

Accessories 20

Schematic 26

Parts List 27

Parts Location Photo 29

Printed in U. S. A. Part No. 84-233C

SPECIFICATIONS

DC Volts

0-3-12-60-300-1200-6000 at 20,000 ohms per volt.

AC Volts

0-3-12-60-300-1200-6000 at 5000 ohms per volt.

DC Microamperes

0-60 at 250 Mv.

DC Milliamperes

0-1.2-12-120 at 250 Mv.

DC Amperes

0-12 at 250 Mv.

Ohms

0-1000-10,000 (4.4-44 at center scale).

Megohms

0-1-100 (4400-440,000 at center scale).

Output Volts (AC)

0-3-12-60-300 at 5000 ohms per volt.

Decibels

—20 to +51 on 600 Ohm line.

Scales

4.3 inches long (max.).

Batteries

One 1.5 volt and one 30 volt battery. Batteries are packed separately.

Meter Protection

Meter movement is protected by diode module.

Test Leads

One red and one black lead supplied, each 48 inches long. Two push-on-type alligator clips included.

Rubber Feet

Four rubber feet are supplied to fit into four holes in the rear of the VOM case.

Size

3-11/32" x 5½" x 7½".

Weight

Approximately 4 lbs.

ACCURACY

(Calibrated at 77° F.)

DC Ranges

6000 volt	4% of full scale
All other	2%

AC Ranges (Calibrated on 60 cycle sine wave)

6000 volt	5% of full scale
All others	3%

Resistance Ranges

All	2% of scale length

INTRODUCTION

The Model 630 is a compact, rugged, portable volt-ohm-milliammeter. It has been designed to make fast, accurate measurements on all types of electrical and electronic equipment and is backed by a company which has been making quality instruments and test equipment for over half a century.

GENERAL INSTRUCTIONS

The following section should be read carefully; it contains instructions and precautions to be observed in making measurements with the VOM.

- Measurements are made with the test leads plugged into the COM— and V-Ω-A jacks, except when measuring output volts (DB), 6000 AC and 6000 DC volts. For these ranges the V-Ω-A test lead is plugged in the appropriate jack (one test lead is in the COM— jack for all measurements).

- The alligator clips provided with the VOM fit over the end of the test probes. When measuring high voltages, the use of these alligator clips will allow measurement without handling the test probes. As a safety measure, always shut off power source before attempting to connect alligator clips.

- When the approximate value of the quantity being measured is not known, always start on the highest range. For greatest accuracy, choose the range which will allow readings to be taken in the upper (right hand) portion of the scale.

- Readings are taken on the scale having the appropriate significant figures (both 3 and 300 volts are read on the 0-300 scale) by multiplying or dividing by a factor of 10 or 100 as indicated by the range/scale ratio (ie: on the 3 volt range divide the scale readings by 100).

• Whenever possible, the test probes should be disconnected from the voltage source (or the source shut off) before the range switch position is changed. This practice will result in an increased life and reliability for the VOM.

• The Meter Zero Adjust Screw is located on the lower center of the meter cover. It should be periodically adjusted so the meter pointer is on zero with no input into the VOM.

• Readings on the sensitive voltage, current and resistance ranges may sometimes be different than calculated values. Thermo-electric or electro-chemical reactions can sometimes generate voltage (or current) in a circuit due to elevated temperatures from soldering, contact of dissimilar metals, chemical fumes or moisture. Also, the fingers should never touch the metal parts of the test probes since body resistance can cause erroneous readings—particularly on the high ohmmeter ranges.

• CAUTION: Always observe the following rules and procedures when making measurements in high voltage circuits.

1. Turn off equipment or other source of voltage, before connecting test probes. Make sure no capacitors in the circuit being tested remain charged to a high voltage.
2. Install alligator clips on test probes. While holding the insulated section of the test probe, check circuit to see if any voltage (or current) is present. If no voltage is present, connect the alligator clips to the circuit to be measured.
3. Turn on equipment, or voltage source, and take required readings. DO NOT handle or touch the VOM, test leads or test probes with power source turned on.

Observing the above rules and precautions will result in continued accurate measurements with your VOM at increased safety to equipment and personnel.

MEASURING D C VOLTS

0-3 thru 0-1200 DC Volts:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in appropriate DCV position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 1.
4. Read voltage on black "DC" scale.

0-6000 DC Volts:

1. Insert test leads in 6000 DCV and COM—jacks.
2. Place selector switch in 6000 DC volt position.
3. Observe all rules and precautions in "General Instruction" section.
4. Connect the test probes across the voltage to be measured as shown in Fig. 1.
5. Read voltage on black "DC" scale.

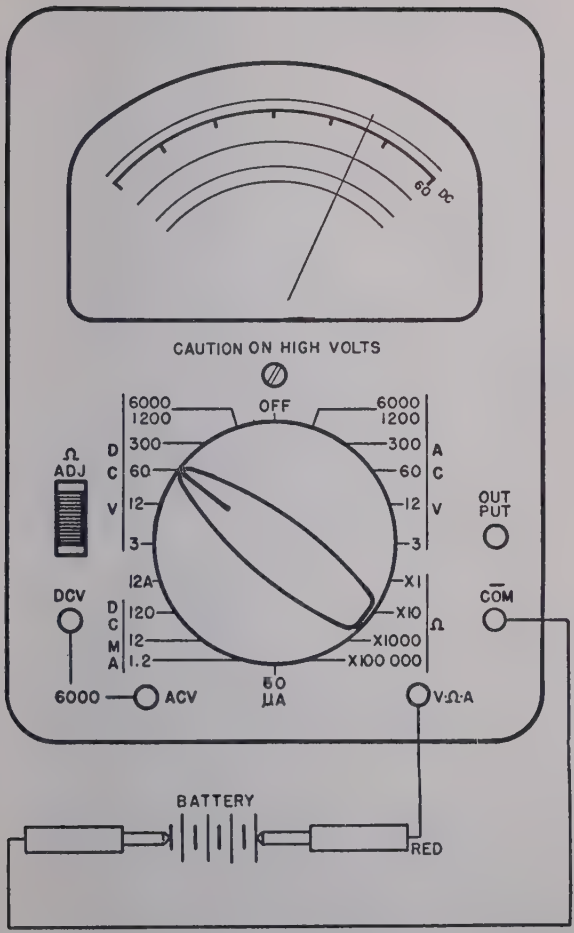


FIGURE 1—MEASURING DC VOLTS

MEASURING AC VOLTS

0-3 AC Volts:

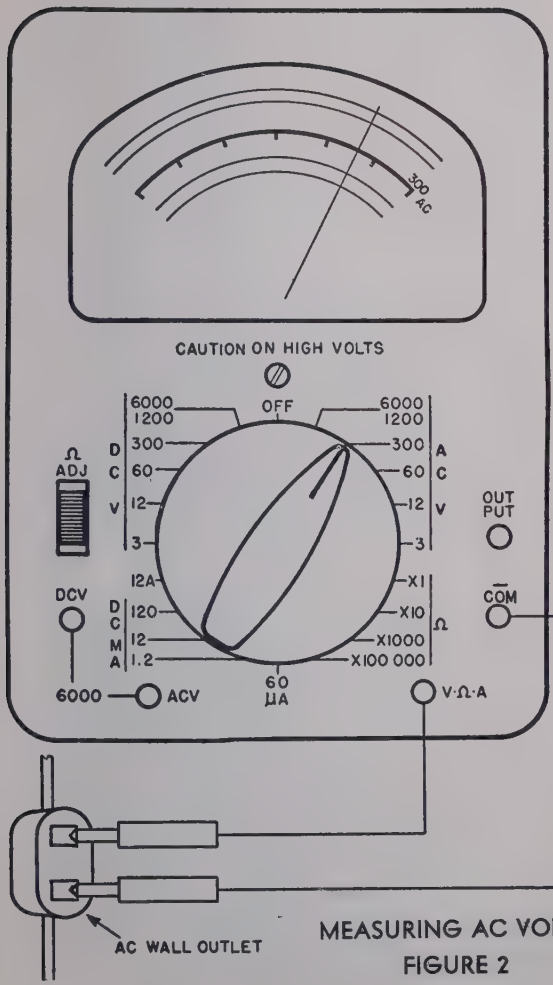
1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in 3 VAC position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 2.
4. Read voltage on lower red 0-3 "AC" scale.

0-12 thru 0-1200 AC Volts:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in appropriate ACV position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 2.
4. Read voltage on black "DC-AC" scale.

0-6000 AC Volts:

1. Insert test leads in 6000 ACV and COM—jacks.
2. Place selector switch in 6000 ACV position.
3. Observe all rules and precautions in "General Instruction" section.
4. Connect the test probes across the voltage to be measured as shown in Fig. 2.
5. Read voltage on black "DC-AC" scale.



MEASURING AC VOLTS
FIGURE 2

MEASURING D C CURRENT

0-60 μA thru 0-12 Amps:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in appropriate position.
3. Connect the test probes in series with the circuit (use alligator clips) as shown in Fig. 3.
4. Read current on black "DC" scale.

The voltage drop across the VOM on all current ranges is 250 millivolts at full scale current. In most cases this voltage drop will not affect the circuit being measured; however, in some low voltage transistor circuits it may be necessary to compensate the circuit on readings for the added voltage drop.

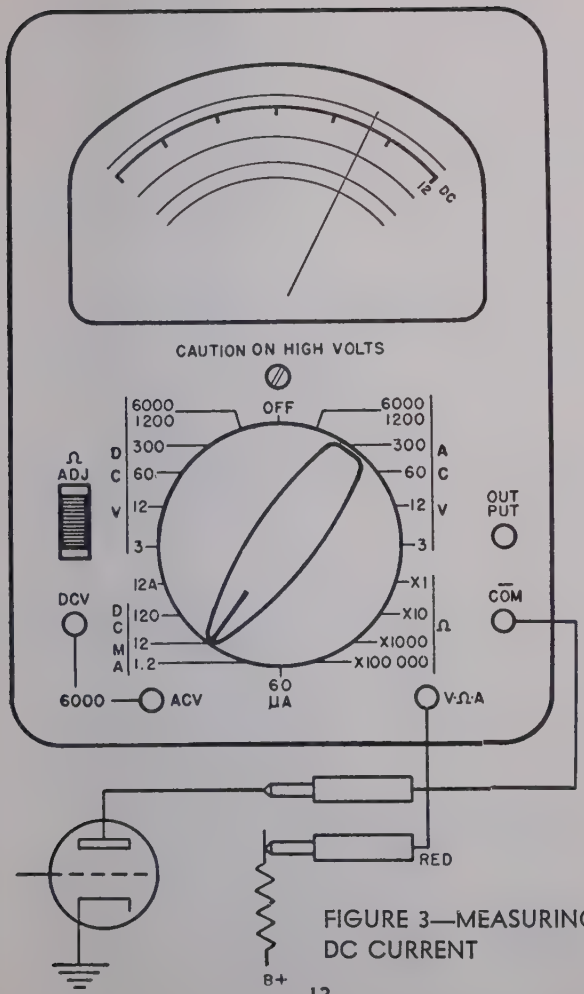


FIGURE 3—MEASURING DC CURRENT

MEASURING D C RESISTANCE

X1 thru X100000 Ohms Ranges:

1. Place selector switch in appropriate ohms range.
2. Short test probes together.
3. Adjust "ΩADJ" control until meter reads zero ohms.
4. Connect test probes to component being measured.
5. Read ohms on top black "Ω" scale (multiply value read times range switch factor).

The component being measured should be disconnected from the circuit before its resistance is measured since any added circuit path can cause an error in measurement. Also, any voltage or current present in the circuit during measurement can cause an error in resistance measurement.

When using the ohmmeter for general continuity and circuit tracing it is recommended the X1000 resistance range be used. The lower battery drain on this range (compared to the X1 range) will result in increased battery life.

Ohmmeter Ranges — Max Voltage (EM) — In Volts

(Note: — Max Power Transfer Occurs when load = the Center Scale R Value.)

Max Short Circuit Current (IM) in Milliamps.
Max Power Transfer to Load (PM) in Milliwatts.

	X-1	X-10	X-1000	X-100000
EM	1.6	1.6	1.6	34
IM	364	36.4	.364	.0773
PM	150	15.0	.150	.655

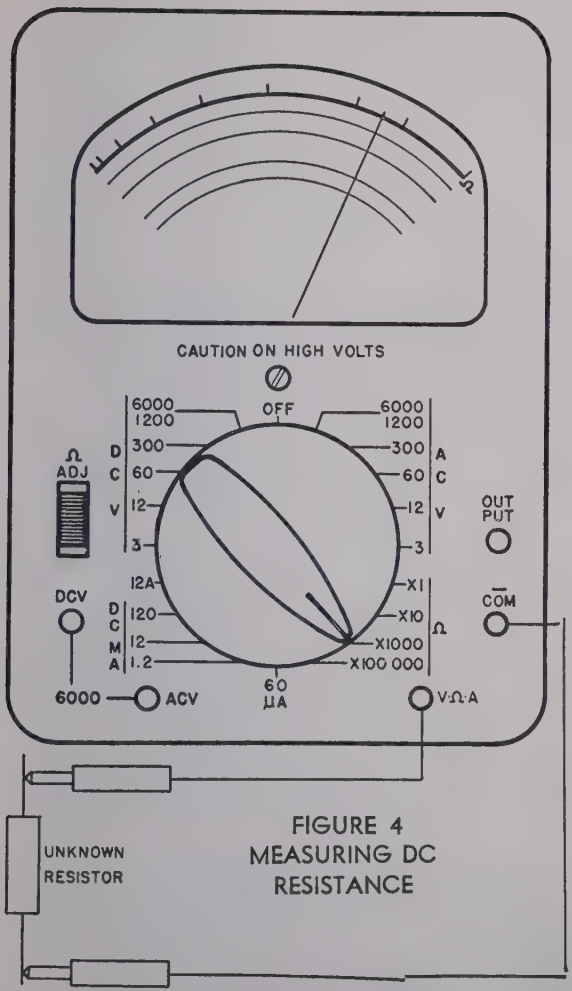


FIGURE 4
MEASURING DC
RESISTANCE

MEASURING OUTPUT VOLTAGE

Output voltage is the AC part of a combined AC and DC voltage. Such a voltage is usually found in amplifier circuits, but it may also be found in other circuits. To measure output voltage, the DC part of the combined voltage must be removed or "blocked." This is done by inserting a capacitor in series with the AC voltage section of the VOM. The Model 630 has a .1 μfd, 400 VDC capacitor between the OUTPUT and V-Ω-A jacks to do this.

0-3 Volts (Figure 16):

1. Insert test leads into the OUTPUT and COM- jacks.
2. Set selector switch to 3 ACV position.
3. Connect test probes across the voltage to be measured.
4. Read voltage on the Red 0-3 "ACV" scale.

0-12 thru 0-300 Volts (Figure 16):

1. Insert test leads into the OUTPUT and COM- jacks.
2. Set selector switch to appropriate ACV range.
3. Connect test probes across the voltage to be measured.
4. Read voltage on "AC-DC" scale.

DO NOT USE THE OUTPUT range in circuits where the sum of the DC voltage and the peak AC voltage is greater than 400 volts.

The impedance of the capacitor is generally insignificant at audio frequencies. However, it may cause the meter to read low at low frequencies. Its effect should be considered in critical low frequency measurements.

WHEN THE VOLTAGE BEING MEASURED is AC with no DC present, the standard AC voltage measurement procedure should be used.

MEASURING DECIBELS (dB)

The decibel is a unit that expresses the ratio of power levels. It is mathematically derived to reduce multiplication and division to

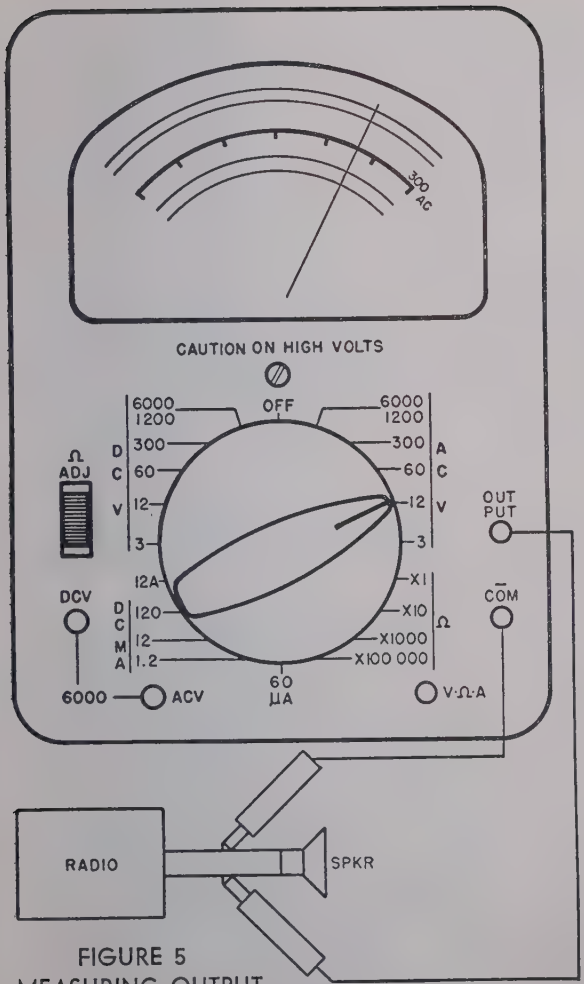


FIGURE 5
MEASURING OUTPUT VOLTS

addition and subtraction, respectively, (e.g. — 10 dB represents multiplication by 10, 20 dB by 100, 30 dB by 1000). The decibel roughly approximates human hearing ratios. For this reason, it is commonly used in audio and telephone measurements.

Because the decibel represents a ratio, there is a reference level. The Model 630 reference level for 0 dB is 1 milliwatt into a 600 ohm load (.775 ACV across 600 ohms). Measurements made across loads other than 600 ohms are relative measurements.

To measure decibels, connect the Model 630 the same as for measuring AC voltage (or OUTPUT voltage, if there is DC voltage present). But, read the dB scale instead of the voltage scales. A chart on the dial shows the dB values to be added to the reading for the different voltage ranges. (e.g. — When the selector switch is set to the 60 VAC position, add 26 dB to the indicated value). As explained above, addition of dB represents multiplication of power (or voltage).

MAINTENANCE

Battery Replacement

Two batteries are used in the ohmmeter circuits.

A 1.5 volt Burgess No. 2 battery, or equivalent, is used in the X1, X10 and X1000 ranges. If the pointer cannot be adjusted to zero when the selector switch is on one of these ranges and the test prods are touched together, the 1.5 volt battery should be replaced.

A 30 volt Burgess U20E battery, or equivalent, is used in the X100000 range. The 30 volt battery should be replaced if the pointer cannot be adjusted to zero when the selector switch is on the X100000 range and the test prods are touched together.

To replace the batteries, remove the four screws in the bottom of the case and lift the back up and off. Remove the old batteries and replace with new ones. Be careful to observe polarity as indicated on the battery compartment.

Fuse Replacement

Spare 1 amp fuse is supplied with this instrument and is stored in the bottom of the battery compartment. CAUTION: Use only the fuses supplied or identical fuses as listed in the parts list. The substitution of fuses or other types and values may not afford proper protection and may also disturb the accuracy of the meter.

Care

- Although this instrument is portable and rugged it should be treated with care. Do not drop or handle it roughly.
- Avoid placing it on a bench where machine tools are used or severe vibration is encountered.
- When possible keep it in a place of moderate temperature. Avoid subjecting it to extreme temperatures and severe temperature changes.
- If the VOM has not been used for a long period of time, rotate the selector switch in both directions several times to wipe the switch contacts for good contact.
- Turn the selector switch to OFF when the VOM is to be carried. The meter is damped in the OFF position to prevent wild swinging of the pointer.

ACCESSORIES

The usefulness and range of the VOM can be extended by the use of the following listed accessories.

HIGH VOLTAGE MEASUREMENTS

Accessory probes are available for measuring high voltages such as found in television receivers and other equipment. To use these probes, plug the probe into the V-Ω-A jack, connect the black ground lead into the COM—jack, and set the selector switch to the position indicated below.

Use extreme caution in measuring high voltages—observe all the rules and precautions listed in the "General Instructions" regarding high voltage measurement.

Kilovolt Probe Part No.	Range	Set Selector Switch To:	Read on Range	Multiply By:
79-70	0-30 KVDC	3 VDC	0-300 VDC	100
79-71	0-30 KVAC	3 VAC	0-300 VAC	100
79-152	0-60 KVAC	3 VAC	0-60 VAC	1000

MEASURING HIGH DC CURRENT

The use of accessory shunts extend the DC current ranges of this instrument.

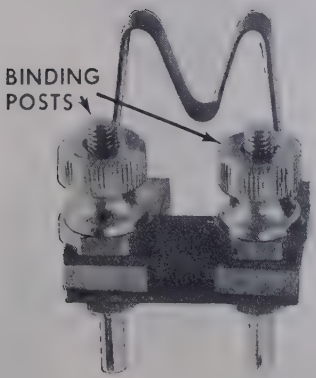
PLUG-IN TYPE: Set the selector switch to the 12 DC MA position, plug the shunt into the V-Ω-A and COM—jacks and connect the circuit to be measured in series with the binding posts on the shunt.

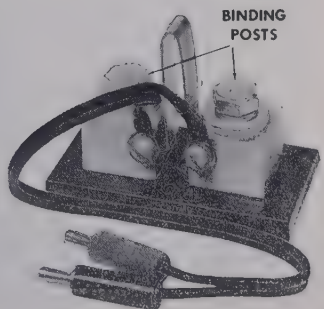
Part No. 91-247 0-30 DC AMP

PORTABLE TYPE: Set the selector switch to the 12 DC MA position, plug the leads on the shunt into the V-Ω-A and COM—jacks and connect the circuit to be measured in series with the binding posts on the shunt.

Part No. 91-248 0-60 DC AMP

Part No. 91-255 0-120 DC AMP

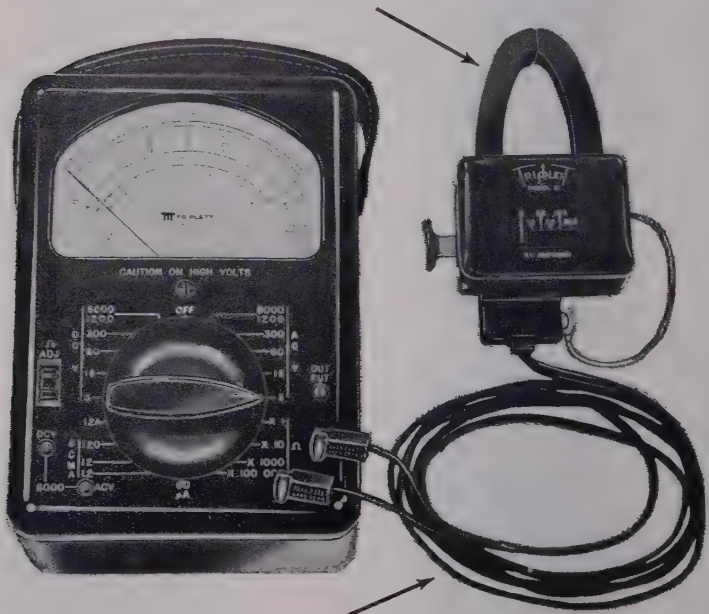




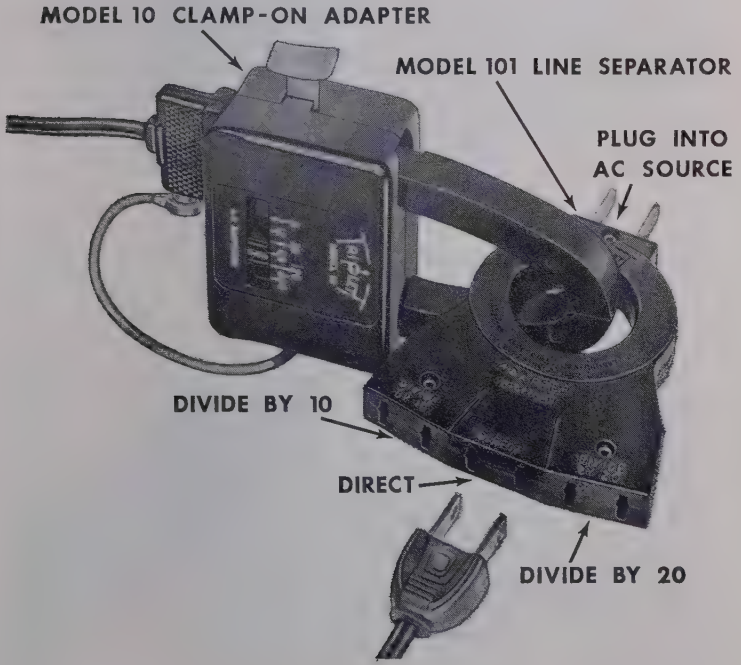
AC CURRENT MEASURING ADAPTER

AC line loads can be checked easily, without breaking the conductors or insulation of the circuit under test, when the MODEL 10 CLAMP-ON AMMETER ADAPTER (Part No. 60A-211) is used. The Adapter is connected with a NO. 611 LEAD ASSEMBLY (Part No. 79A-160). The lever on the side of the Model 10 Adapter is pressed to open the split yoke of the adapter so it can be placed over and closed around the lead or bus bar carrying the current being measured. Readings up to 300 AC amperes can be made.

Set selector switch to 3V AC.



THE MODEL 101 LINE SEPARATOR (Part No. 60A-218) is used to divide a circuit using two-conductor cable so one conductor can be encircled by the adapter yoke. The Model 101 is plugged into the AC outlet and the AC cord of the equipment to be measured is plugged into the appropriate socket on the Model 101. The split yoke of the Model 10 Adapter is clipped through the loop in the Model 101 to make the current measurement. Use of the "Divide By 10" and "Divide By 20" sockets on the Model 101 Line Separator makes a convenient and fast method of measuring extremely low AC currents.



MODEL 639-OS

LEATHER CARRYING CASE

CASE 639-OS

Black leather case, has built-in stand on back. Flaps open to permit use of tester in case. Compartment for accessories. For use with 630 series testers.

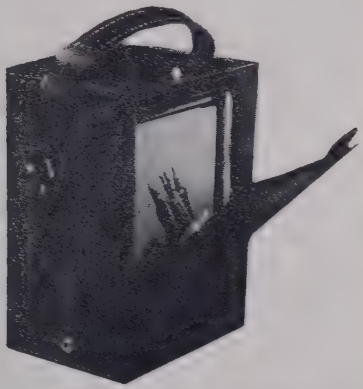
LEATHER CARRYING CASES

MODEL 639-N

639-N black cowhide leather carrying case. For use with 630 series testers. Stand included at no extra cost. Leather strap handle.

MODEL 639 leather carrying case has adequate space for Triplett 630 series tester, instructions, and accessories. Black cowhide leather, provided with strong leather strap handle.

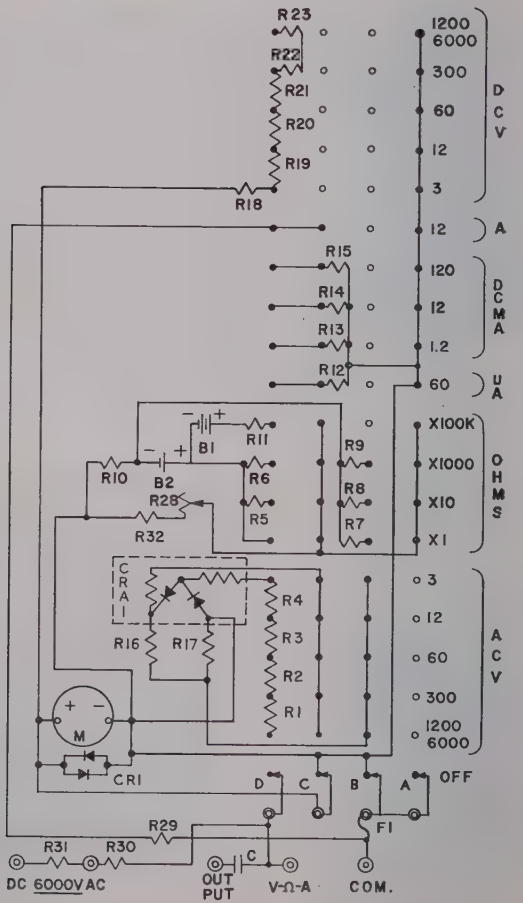
MODEL 639-P is a leather carrying case padded with 3/8" sponge rubber which gives the instrument maximum protection. Has adequate space for any 630 series tester, instructions, and leads. Black cowhide; leather strap handle.



Rear view shows large accessory compartment permitting free access to tester stand, leads and instructions.

MODEL 639/639-P

CIRCUIT DIAGRAM



Ref. No.		Description	Part No.
B1	Battery	30V Eveready 413, or NEDA #210	T-37-19.
B2	Battery	1.5V Burgess #2 or NEDA #13	T-2426-1
C	Capacitor	.1 Mfd. 400 DCWV	T-43-69
F1	Fuse	1 Amp. Littlefuse 3AG 312001	3207-15
M	Instrument	50 μa, 250 Mv with panel. Bar Ring	52-4928
R1	Resistor	4.5 Megohm	T-15-1231
R2	Resistor	1.2 Megohm	15K-1204TC5
R3	Resistor	240K Ohm	15K-2403TC5
R4	Resistor	45K Ohm	15K-4502TC5
R5	Resistor	6.5 Ohm	T-15-4114
R6	Resistor	732 Ohm	15K-7320TC5
R7	Resistor	3.7 Ohm	T-15-3223
R8	Resistor	37.2 Ohm	15-4116
R9	Resistor	4690 Ohm	15K-4691TC5
R10	Resistor	13.6K Ohm	15K-1362TC5
R11	Resistor	423K Ohm	15K-4233TC5
R12	Resistor	25K Ohm	15K-2502TC5
R13	Resistor	217.4 Ohm	T-15-2288
R14	Resistor	20.92 Ohm	T-15-2813
R15	Resistor	2.084 Ohm	T-15-1558
R16) R17)	Resistor	5K	15K-5001TC5
R18	Resistor	55K Ohm	15K-5502TC5
R19	Resistor	180K Ohm	15K-1803TC5
R20	Resistor	960K Ohm	15K-9603TC5
R21	Resistor	4.8 Megohm	15-2436
R22) R23)	Resistor	9 Megohm	T-15-2437
R28	Resistor	20K Ohm Variable	T-16-31
R29	Shunt	12 Amp. 250 Mv Strip Type	90A-710
R30	Resistor	24 Megohms	T-15-1226
R31	Resistor	Assembly	15-5434
R32	Resistor	5100 Ohm	15R-512JC

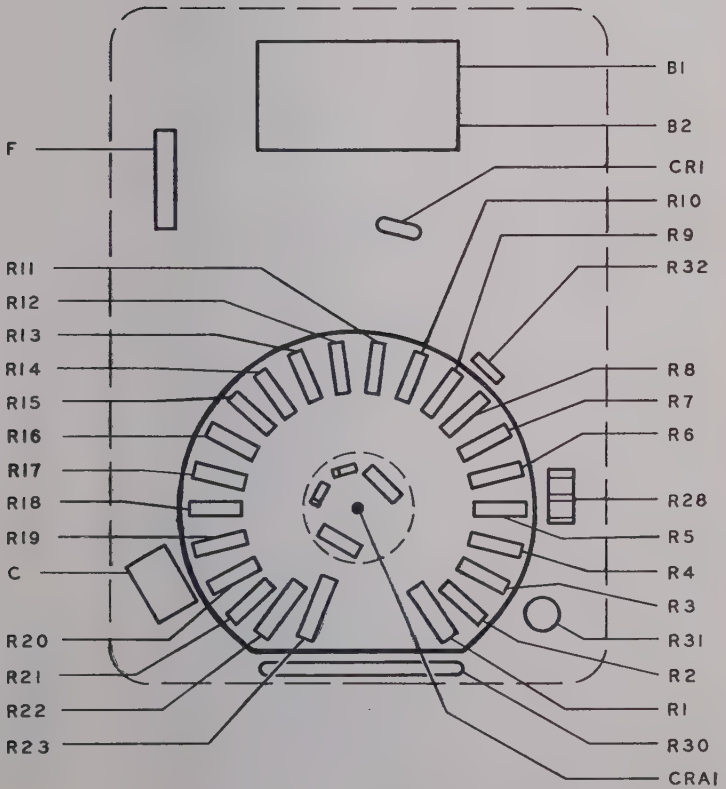
Ref. No.	Description		Part No.
CRA1	Rectifier Assem.		2250-68
CR1	Meter	Protection Diode	11670
	Case	Phenolic with Strap Handle	T-10-784
	Knob	Molded	34-61
	Leads		T-79-127
SW1	Switch	20-pos., 4 deck without resistors	22A-439
	Switch	20-pos., 4 deck with resistors	22-575
	Front Assembly	(panel)	108-2163
	Glass	Window	19-106
	Clip	Alligator	2563-A

Repair or Service

In the event repair or service is required, please outline the nature of the difficulty. By providing this information, Triplett can supply more efficient service.

INTERIOR VIEW

PARTS LOCATION



WARRANTY

The Triplett Corporation warrants instruments manufactured by it to be free from defective material or factory workmanship and agrees to repair or replace such instruments which, under normal use and service, disclose the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing or replacing any instrument or test equipment which proves to be defective, when returned to us transportation prepaid, within ninety (90) days from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons or service stations in any way so as, in our judgment to injure their stability or reliability or which have been subject to misuse, negligence or accident or which have had the serial number altered, effaced, or removed. Neither does this warranty apply to any of our products, which have been connected, installed, or adjusted otherwise than in accordance with the instructions furnished by us. Accessories including all vacuum tubes and batteries not of our manufacture used with this product are not covered by this warranty.

The Triplett Corporation reserves the right to discontinue models at any time, or change specifications, price or design, without notice and without incurring any obligation.

Upon acceptance of this material the purchaser agrees to assume all liability for any damages, and bodily injury which may result from the use or misuse of the material by the purchaser, his employees, or others and that the Triplett Corporation shall incur no liability for direct or consequential damage of any kind.

Parts will be made available for a maximum period of five (5) years after the manufacture of this equipment has been discontinued. Parts include all materials, charts, instructions, diagrams, accessories, et cetera, which were furnished in the standard or special models.

This warranty and conditions of sale are in lieu of all others expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

TRIPLETT CORPORATION
BLUFFTON, OHIO 45817

MP MASTER
MA26291